



**National Voluntary  
Laboratory Accreditation Program**



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005**

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**CALIBRATION LABORATORIES**

**NVLAP LAB CODE 200625-0**  
 Scope Revised: 2011-11-02

**NVLAP Code:** 20/A01                      ANSI/NCSL Z540-1-1994; Part 1                      Compliant

**NVLAP Code:** 20/E05  
 DC Current

<i>Signal Level Range</i>	<i>Best Uncertainty (±) (% of reading + % of range) <sup>notes 1, 4</sup></i>	<i>Remarks</i>
1 mA to 10 mA	0.11 + 0.02	34401A
10 mA to 100 mA	0.12 + 0.005	34401A
100 mA to 1 mA	0.25 + 0.01	34401A
1 A to 3 A	0.2 + 0.02	34401A

DC Resistance (4-wires)

<i>Signal Level Range</i>	<i>Best Uncertainty (±) (% of reading + % of range) <sup>notes 1, 4</sup></i>	<i>Remarks</i>
1 Ω to 100 Ω	0.1 + 0.006	34401A
100 Ω to 1 MΩ	0.1 + 0.004	34401A

2011-04-01 through 2012-03-31

*Dally S. Bruce*

Effective dates

For the National Institute of Standards and Technology



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## CALIBRATION LABORATORIES

NVLAP LAB CODE 200625-0  
Scope Revised: 2011-11-02

NVLAP Code: 20/E06  
DC Voltage

Signal Level Range	Best Uncertainty ( $\pm$ ) (% of reading + % of range) <sup>notes 1, 4</sup>	Remarks
1 mV to 100 mV	0.0055 + 0.0036	34401A
100 mV to 1 V	0.0055 + 0.0007	34401A
1 V to 10 V	0.0055 + 0.0005	34401A
10 V to 100 V	0.0055 + 0.0006	34401A
100 V to 1000 V	0.0055 + 0.0010	34401A

NVLAP Code: 20/E09  
AC Voltage  
Measuring equipment: generate

Signal Level Range	Frequency Domain	Frequency Best Uncertainty ( $\pm$ ) <sup>notes 1, 4</sup>	Level Best Uncertainty ( $\pm$ ) <sup>notes 1, 4</sup>	Remarks
10 $\mu$ V <sub>pp</sub> to 40 V <sub>pp</sub>	0.001 Hz to 200 kHz	61 ppm + 4 mHz	1.1 %	SR DS360 Generate: Sine Square, two-tone
10 $\mu$ V <sub>pp</sub> to 40 V <sub>pp</sub>	0.001 Hz to 200 kHz ON: 1/2, 1 to 65534 periods Rep. Rate 1 to 65535 Off atten to 10 kHz: >70 dB	61 ppm + 4 mHz	1.1 %	SR DS360 Generate: Sine or square bursts
10 $\mu$ V <sub>pp</sub> to 40 V <sub>pp</sub>	1 Hz to 100 kHz CF: 11 db	1 dB	Broadband noise: white	
10 $\mu$ V <sub>pp</sub> to 40 V <sub>pp</sub>	10 Hz – 200 kHz CF: 12 db	2 dB	Pink noise: measured w/ 1/3 octave analysis	

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Measuring equipment – measure

AC Voltage Transfer

<b>Range</b>	<b>Frequency Domain</b>	<b>Best Uncertainty (<math>\pm</math>)</b> <sup>note 1</sup>	<b>Remarks</b>
1 mV – 750 V	10 Hz to 50 kHz	0.001 % of rdg + 0.002 % FS	34401A
1 mV – 750 V	50 kHz to 200 kHz	0.001 % of rdg + 0.005 % FS	34401A

AC Voltage: true RMS

<b>Signal Level Range</b>	<b>Frequency Domain</b>	<b>Best Uncertainty (<math>\pm</math>)</b> <sup>notes 1, 4</sup>	<b>Remarks</b>
50 $\mu$ V to 1 mV	20 Hz to 20 kHz	0.24 dB	N-1504A System
	3 Hz to 100 kHz	0.40 dB	N-1504A System

AC Voltage Transfer

<b>Range</b>	<b>Frequency Domain</b>	<b>Best Uncertainty (<math>\pm</math>)</b> <sup>notes 1</sup>	<b>Remarks</b>
1 mV to 750V	10 Hz to 50 kHz	0.09 % of reading + 0.002 % FS	34401A
1 mV to 750V	50 kHz to 200 kHz	0.09 % of reading + 0.005 % FS	34401A

<b>Range</b>	<b>Frequency Domain</b>	<b>Best Uncertainty (<math>\pm</math>)(% of reading + % of range)</b> <sup>notes 1, 4</sup>	<b>Remarks</b>
1 mV to 100 mV	3 Hz to 5 Hz	1.0 + 0.04	34401A
	5 Hz to 10 Hz	0.36 + 0.04	34401A
	10 Hz to 20 kHz	0.12 + 0.04	34401A
	20 kHz to 50 kHz	0.16 + 0.05	34401A
	50 kHz to 100 kHz	0.62 + 0.08	34401A
100 mV to 750 V	100 kHz to 300 kHz	4.0 + 0.50	34401A
	3 Hz to 5 Hz	1.0 + 0.03	34401A
	5 Hz to 10 Hz	0.36 + 0.03	34401A
	10 Hz to 20 kHz	0.12 + 0.03	34401A
	20 kHz to 50 kHz	0.16 + 0.05	34401A
	50 kHz to 100 kHz	0.62 + 0.08	34401A
100 kHz to 300 kHz	4.0 + 0.50	34401A	

<b>Self Generated Noise</b>	<b>Frequency Domain</b>	<b>Best Uncertainty (<math>\pm</math>) in dB</b> <sup>notes 1, 4</sup>	<b>Remarks</b>
1 $\mu$ V to 10 V	0.1 Hz to 20 kHz	0.85	840 RTA
>30 $\mu$ V	20 Hz to 80 kHz	2	HP 8903A

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## CALIBRATION LABORATORIES

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<i>Parameter Range</i>	<i>Frequency Domain</i>	<i>Signal Level Range</i>	<i>Best Uncertainty (±) <sup>notes 1, 4</sup></i>	<i>Remarks</i>
Signal distortion				
>0.1 %	6 Hz to 20 kHz	100 mV to 10 V	4.5 % of rdg. + 0.03 % distortion	840Analyzer
>0.01 %	20 kHz to 100 kHz	50 mV to 300 V	2.3 dB	HP 8903A
Signal to noise ratio <80 dB	50 Hz to 100 kHz	50 mV to 300 V	1.5 dB	HP 8903A

## TIME & FREQUENCY

NVLAP Code: 20/F01

Frequency dissemination: Frequency and period

<i>Signal Level Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in % of reading <sup>notes 1, 4</sup></i>	<i>Remarks</i>
100 mV to 750 V	3 Hz to 5 Hz	0.1	34401A
	5 Hz to 10 Hz	0.05	34401A
	10 Hz to 40 Hz	0.03	34401A
	40 Hz to 300 kHz	0.01	34401A

<i>Parameter Range</i>	<i>Best Uncertainty (±) <sup>notes 1, 4</sup></i>	<i>Remarks</i>
Time intervals >8 s	1 s	Chronometer

PIR Index: Analyzer

<i>Parameter Range</i>	<i>Frequency Domain</i>	<i>Signal Type</i>	<i>Best Uncertainty <sup>notes 1, 4</sup></i>	<i>Remarks</i>
0 – 60 dB	40 Hz – 10 kHz	Broadband noise	1.4 dB	
PIR intensity probe 0 - 60 dB	40 Hz – 10 kHz	Broadband noise	2.5 dB	

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## CALIBRATION LABORATORIES

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Scope Revised: 2011-11-02

### MECHANICAL

NVLAP Code: 20/M01

Acoustic

Sensitivity or open circuit sensitivity: direct and comparison methods

Range	Frequency Domain	Best Uncertainty ( $\pm$ ) in dB <small>notes 1, 3</small>	Remarks
-70 dB to <-50 dB re 1 V/Pa (0.3 mV/Pa to 3 mV/Pa)	250 Hz	0.12	Comparison and direct
-50 dB to 0 dB re 1 V/Pa (3 mV/Pa to 1V/Pa)	250 Hz	0.09	Comparison and direct
-70 dB to <-50 dB re 1 V/Pa (0.3 mV/Pa to 3 mV/Pa)	1 kHz	0.13	Comparison
-50 dB to 0 dB re 1 V/Pa (3 mV/Pa to 1 V/Pa)	1 kHz	0.11	Comparison

Frequency Response: electrostatic excitation (applicable for condenser microphones with removable grid)

Range	Frequency Domain	Best Uncertainty ( $\pm$ ) in dB <small>notes 1, 4</small>		Remarks
		Actuator response	Free-field and diffuse field responses <small>note 2</small>	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	31.5 Hz to 100 Hz	0.20	0.20	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>100 Hz to 1.25 kHz	0.14	0.18	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>1.25 kHz to 4 kHz	0.14	0.23	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>4 kHz to 8 kHz	0.17	0.45	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>8 kHz to 10 kHz	0.38	0.57	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>10 kHz to 16 kHz	0.38	0.77	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>16 kHz to 20 kHz	0.59	0.89	

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-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>20 kHz to 50 kHz	0.8	2.1
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>50 kHz to 100 kHz	1.1	4.2

Frequency Response: acoustical method

<b>Microphone Sensitivity Range</b>	<b>Frequency Domain</b>	<b>Best Uncertainty (<math>\pm</math>) in dB <sup>notes 1, 4</sup></b>		<b>Remarks</b>
		<b>Pressure response</b>	<b>Free-field and diffuse field responses <sup>note 2</sup></b>	
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	31.5 Hz	0.14	0.17	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	63 Hz	0.13	0.20	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	125 Hz	0.13	0.20	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	250 Hz	0.09	0.15	1253 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	500 Hz	0.13	0.16	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	1 kHz	0.11	0.13	1253 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	2 kHz	0.13	0.22	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	4 kHz	0.13	0.32	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	8 kHz	0.14	0.44	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	12.5 kHz	0.14	0.70	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	16 kHz	0.23	0.75	4226 Calibrator

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## CALIBRATION LABORATORIES

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### Acoustical Calibrators and Pistonphones

Sound pressure level (SPL)

<i>SPL Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in dB <sup>note 1</sup></i>	<i>Remarks</i>
90 dB to 140 dB re 20 µPa	31.5 Hz (± 2 Hz)	0.11	Direct Method
	63 Hz to 800 Hz	0.10	Direct Method
	250 Hz (± 10 Hz)	0.09 <sup>note 3</sup>	Direct Method
	250 Hz (± 10 Hz)	0.09 <sup>note 4</sup>	Direct Method
	1 kHz (± 40 Hz)	0.11 <sup>note 3</sup>	Direct Method
	1 kHz (± 40 Hz)	0.10 <sup>note 4</sup>	Direct Method
	1250 Hz to 5 kHz	0.11	Direct Method
	6.3 kHz to 8 kHz	0.14	Direct Method
	10 kHz to 12.5 kHz	0.16	Direct Method
	16 kHz	0.21	Direct Method

Sound level stability

<i>SPL Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in dB <sup>note 1</sup></i>	<i>Remarks</i>
90 dB to 140 dB re 20 µPa	20 Hz to 20 kHz	0.03	1504A

<i>Range</i>	<i>SPL Domain</i>	<i>Best Uncertainty(±)(% of reading) <sup>notes 1, 4</sup></i>	<i>Remarks</i>
10 Hz to 40 Hz	70 dB to 140 dB re 20 µPa	0.03	34401A
40 Hz to 20 kHz	70 dB to 140 dB re 20 µPa	0.01	34401A

### Frequency Stability

<i>Stability Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty(±) in % <sup>notes 1, 4</sup></i>	<i>Remarks</i>
>0.01 %	10 Hz to 20 kHz	5 % of the measured stability value	

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### Sound Distortion

<i>Distortion Range</i>	<i>Frequency Domain</i>	<i>Sound Pressure Level Domain</i>	<i>Best Uncertainty (±) in % distortion</i> <sup>notes 1, 4</sup>	<i>Remarks</i>
>0.1 %	10 Hz to 20 kHz	50 dB to 140 dB re 20 µPa	4.5% of rdg. + 0.1 % distortion	Analyzer Method

Sound Level Meters, Dosimeters, Real-time and FFT analyzers, Filter sets  
Acoustical Tests  
Sound Pressure Level: fixed points, tones

<i>SPL Range in dB</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in dB</i> <sup>note 1</sup>		<i>Remarks</i>
		<i>Pressure Response</i>	<i>Free-field and diffuse field responses</i> <sup>note 2</sup>	
94, 104, 114	31.5 Hz	0.15	0.20	4226 Calibrator
94, 104, 114	63 Hz	0.14	0.20	4226 Calibrator
94, 104, 114	125 Hz	0.14	0.20	4226 Calibrator
94, 104, 114	250 Hz	0.14	0.15	4226 Calibrator
124	250 Hz	0.09	0.11	1253 Calibrator
94, 104, 114	500 Hz	0.14	0.15	4226 Calibrator
94, 104, 114	1 kHz	0.13	0.13	4226 Calibrator
124	1 kHz	0.12	0.13	1253 Calibrator
94, 104, 114	2 kHz	0.14	0.20	4226 Calibrator
94, 104, 114	4 kHz	0.14	0.25	4226 Calibrator
94, 104, 114	8 kHz	0.14	0.45	4226 Calibrator
94, 104, 114	12.5 kHz	0.15	0.70	4226 Calibrator
94, 104, 114	16 kHz	0.25	0.75	4226 Calibrator

### Tone Burst Sounds

<i>SPL Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in dB</i> <sup>note 1</sup>	<i>Remarks</i>
80 dB to 100 dB re 20 µPa	2 kHz	0.15	4226 Calibrator

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Timed sounds  
Measuring Equipment (generate)

<i>SPL Range in dB</i>	<i>Frequency Domain in kHz</i>	<i>Best Uncertainty (<math>\pm</math>) in % dose <sup>note 1</sup></i>	<i>Remarks</i>
94	1	0.01	Accoustical SLM2009
104	1	0.03	Accoustical SLM2009
114	1	0.12	Accoustical SLM2009
124	1	0.26	Accoustical SLM2009

NVLAP Code: 20/M11  
Vibration

Exciters and Vibration Calibrators  
Acceleration: measure

<i>Level Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (<math>\pm</math>) in % <sup>note 1, 4</sup></i>	<i>Remarks</i>
0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	40 Hz to 400 Hz	1.2	Vib exciters 2011
0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	20 Hz to 5 kHz	1.8	Vib exciters 2011
0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	>5 kHz to 10 kHz	3.0	Vib exciters 2011
0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	10 Hz to 16 Hz	12	Vib exciters 2011

Motion Frequency

<i>Range</i>	<i>Acceleration Domain</i>	<i>Best Uncertainty (<math>\pm</math>) in % of reading <sup>notes 1, 4</sup></i>	<i>Remarks</i>
3 Hz to 5 Hz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	0.16	33401A
>5 Hz to 10 Hz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	0.18	33401A
>10 Hz to 40 Hz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	0.20	33401A
>40 Hz to 100 Hz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	0.06	33401A
>100 Hz to 300 Hz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	0.03	33401A
>300 Hz to 10 kHz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	0.01	33401A

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Distortion of Motion

<i>Distortion Range</i>	<i>Frequency Domain</i>	<i>Vibration Level Domain</i>	<i>Best Uncertainty (<math>\pm</math>) in distortion %</i> <sup>notes 1, 4</sup>	<i>Remarks</i>
<0.1%	10 Hz to 10 kHz	0.1 m/s <sup>2</sup> to 200 m/s <sup>2</sup>	4.5 % of rdg. + 0.1 distortion	Analyzer Method

Accelerometers

Accelerometer sensitivity: comparison method

<i>Range Charge</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (<math>\pm</math>) in %</i> <sup>notes 1, 4</sup>	<i>Remarks</i>
>0.03 pC/(m/s <sup>2</sup> ) to 5000 pC/(m/s <sup>2</sup> )	10 Hz	1.3	
Voltage	12.5 Hz to 1000 Hz	1.2	
0.03 mV/(m/s <sup>2</sup> ) to 5 V/(m/s <sup>2</sup> )	>1000 Hz to 4 kHz	1.5	
	>4 kHz to 10 kHz	2.0	

Velocity sensors:

Comparison method

<i>Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (<math>\pm</math>) in %</i> <sup>notes 1, 4</sup>
Charge		
>0.03 pC/(m/s) to 5000 pC/(m/s)	10 Hz to 16 Hz	3
Voltage	20 Hz to 80 Hz	2
0.3 mV/(m/s) to 10 V/(m/s)	100 Hz to 200 Hz	1.3
	250 Hz to 4 kHz	2
	>4 kHz to 10 kHz	3

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Field Calibrations  
Specials

Accelerometers  
sensitivity: calibrator  
method

<i>Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (<math>\pm</math>) in % <sup>notes 1, 4</sup></i>	<i>Remarks</i>
Charge 0.12 pC/(m/s <sup>2</sup> ) to 1.2 nC/(m/s <sup>2</sup> )	70 Hz to 400 Hz	2.5	VC-110
Voltage 0.12 mV/(m/s <sup>2</sup> ) to 1.2 V/(m/s <sup>2</sup> )	>400 Hz to 1 kHz	2.6	VC-110
	>1000 Hz to 7.5 kHz	6.0	VC-110
	>7500 Hz to 10 kHz	6.5	VC-110

1. Represents an expanded uncertainty using a coverage factor  $k = 2$ , at an approximate level of confidence of 95%.
2. These characteristics are calculated using the measured actuator/pressure response and the correction coefficients provided by the manufacturer of the tested device.
3. At reference conditions.
4. At actual conditions.

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